

Name: \_\_\_\_\_




Date: \_\_\_\_\_

**Exam: Function Reflections (Solution version 8)**

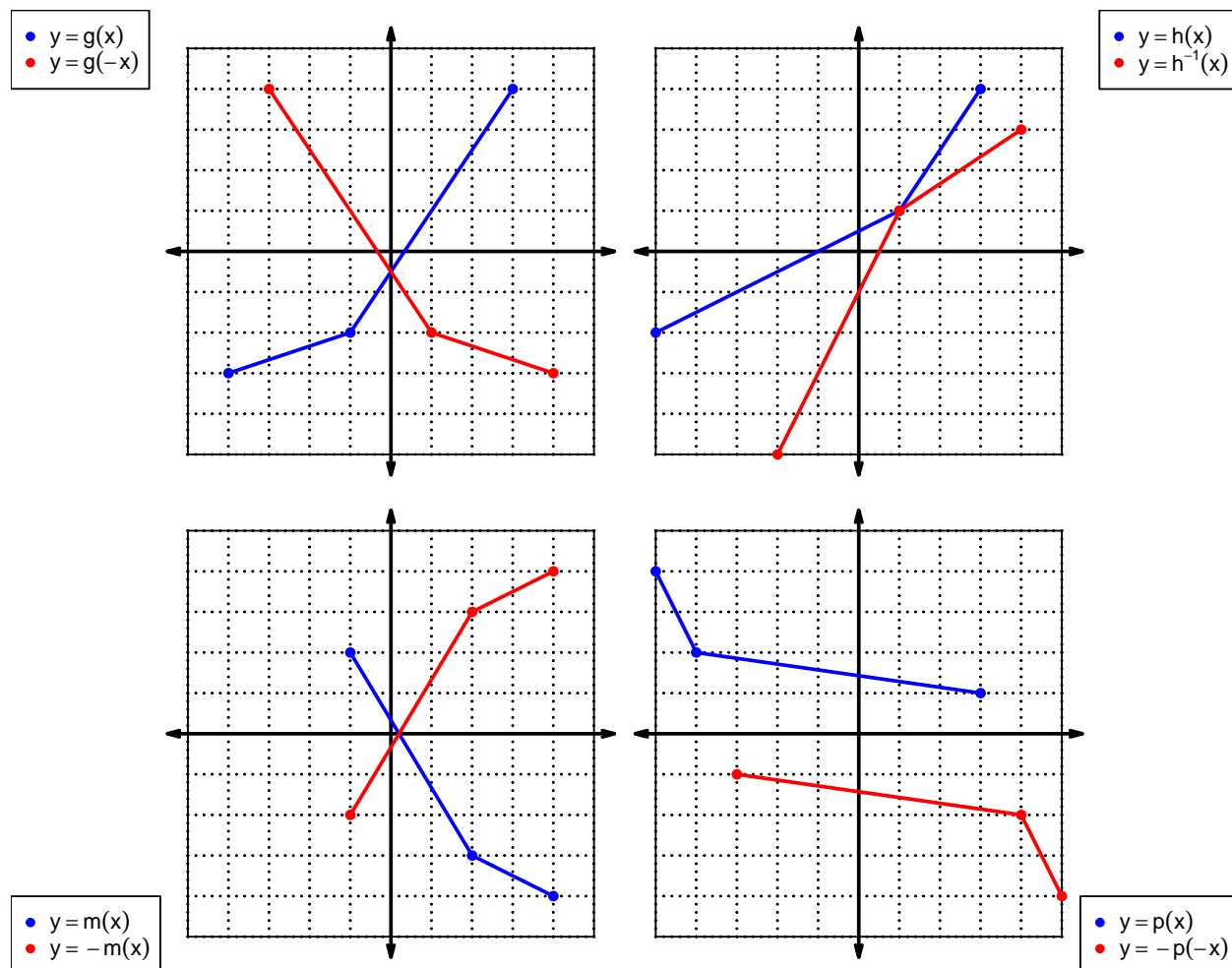
1. Let function  $f$  be defined by the polynomial below:

$$f(x) = -5x^5 + 8x^4 - 3x^3 - 9x^2 + 4x - 7$$

Draw lines that match each function reflection with its polynomial:

Reflections		Polynomials
$-f(-x)$		$-5x^5 - 8x^4 - 3x^3 + 9x^2 + 4x + 7$
$-f(x)$		$5x^5 - 8x^4 + 3x^3 + 9x^2 - 4x + 7$
$f(-x)$		$5x^5 + 8x^4 + 3x^3 - 9x^2 - 4x - 7$

2. In each  $xy$  plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The  $x$  axis is horizontal and the  $y$  axis is vertical (as typical), and the scale is equal on both axes.



## Exam: Function Reflections (Solution version 8)

For all questions on this page, the functions  $f$ ,  $g$ , and  $h$  are defined by the table below.

$x$	$f(x)$	$g(x)$	$h(x)$
1	4	9	2
2	7	4	6
3	5	6	4
4	6	7	8
5	1	2	1
6	8	1	7
7	3	3	9
8	9	5	3
9	2	8	5

3. Evaluate  $g(1)$ .

$$g(1) = 9$$

4. Evaluate  $f^{-1}(6)$ .

$$f^{-1}(6) = 4$$

5. By filling more rows of the table, it is possible to make function  $h$  **even**. If that were done, what would be the value of  $h(-7)$ ?

If function  $h$  is even, then

$$h(-7) = 9$$

6. By filling more rows of the table, it is possible to make function  $f$  **odd**. If that were done, what would be the value of  $f(-5)$ ?

If function  $f$  is odd, then

$$f(-5) = -1$$

## Exam: Function Reflections (Solution version 8)

7. A function,  $f$ , is **even** if  $f(x) = f(-x)$  for all  $x$  in the domain. A function,  $g$ , is **odd** if  $g(x) = -g(-x)$  for all  $x$  in the domain.

Let polynomial  $p$  be defined with the following equation:

$$p(x) = -x^2 + x$$

- a. Express  $p(-x)$  as a polynomial in standard form.

$$p(-x) = -(-x)^2 + (-x)$$

$$p(-x) = -x^2 - x$$

- b. Express  $-p(-x)$  as a polynomial in standard form.

$$-p(-x) = -(-x^2 - x)$$

$$-p(-x) = x^2 + x$$

- c. Is polynomial  $p$  even, odd, or neither?

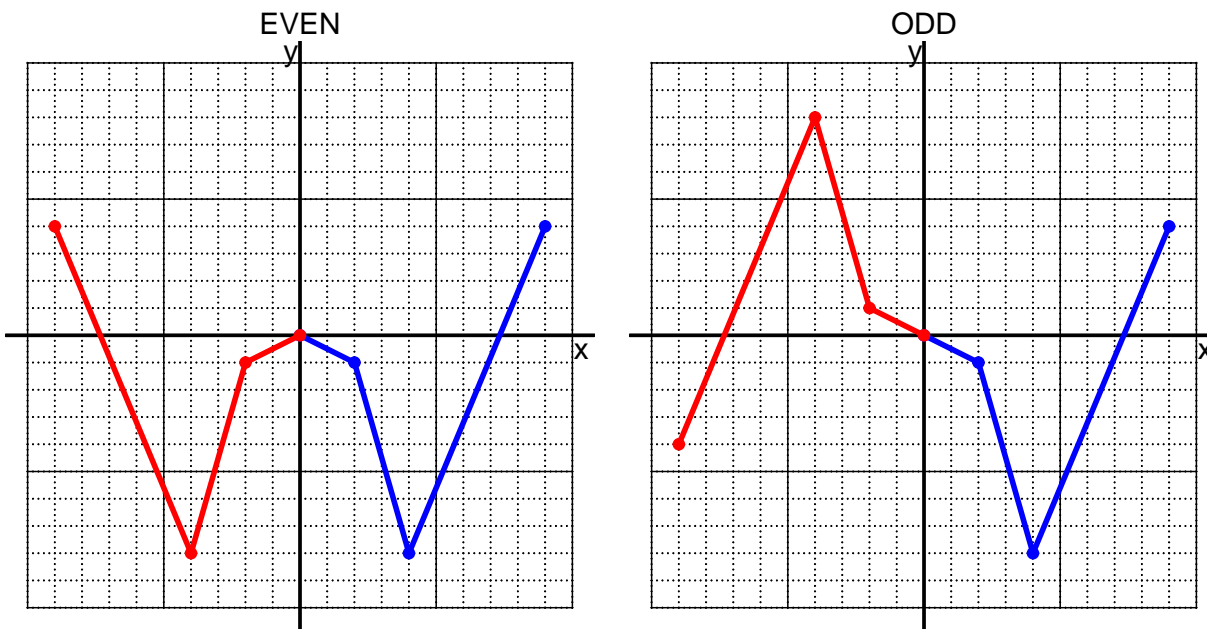
neither

- d. Explain how you know the answer to part c.

We see that  $p(x)$  is not equivalent to either  $p(-x)$  or  $-p(-x)$ , so  $p$  is neither even nor odd.

## Exam: Function Reflections (Solution version 8)

8. I have drawn half of a function. Draw the other half to make it even or odd.



9. Let function  $f$  be defined with the equation below.

$$f(x) = 8x - 9$$

a. Evaluate  $f(6)$ .

step 1: multiply by 8  
step 2: subtract 9

$$f(6) = 8(6) - 9$$

$$f(6) = 39$$

b. Evaluate  $f^{-1}(47)$ .

step 1: add 9  
step 2: divide by 8

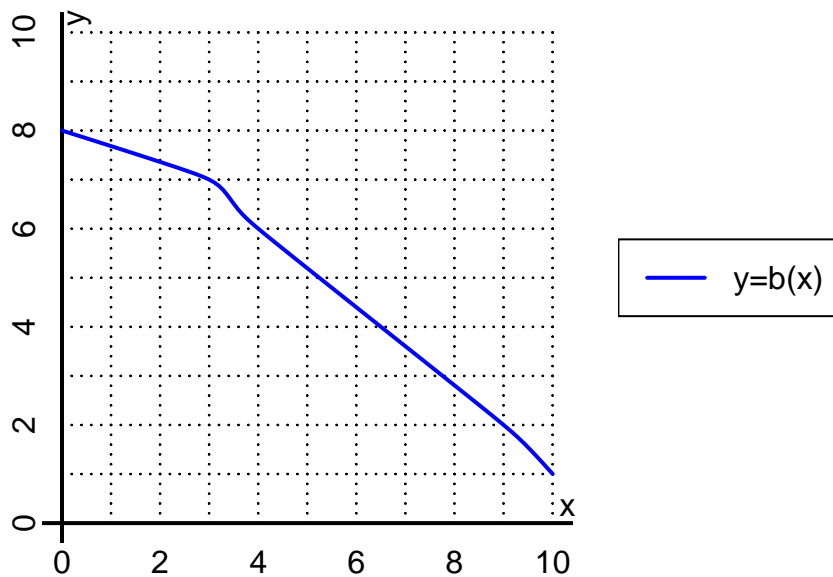
$$f^{-1}(x) = \frac{x + 9}{8}$$

$$f^{-1}(47) = \frac{(47) + 9}{8}$$

$$f^{-1}(47) = 7$$

## Exam: Function Reflections (Solution version 8)

10. The function  $b$  is represented by the curve  $y = b(x)$  graphed below.



a. Evaluate  $b(4)$ .

$$b(4) = 6$$

b. Evaluate  $b^{-1}(2)$ .

$$b^{-1}(2) = 8$$

## Exam: Function Reflections (Solution version 8)

11. Function  $f$  is defined by the table below.

a. Complete the columns for  $-f(x)$  and  $f(-x)$  and  $-f(-x)$ .

$x$	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	-7	7	7	-7
-1	9	-9	-9	9
0	0	0	0	0
1	-9	9	9	-9
2	7	-7	-7	7

b. Is function  $f$  even, odd, or neither?

odd

c. How do you know the answer to part b?

Function  $f$  is odd because column  $-f(-x)$  matches column  $f(x)$  exactly.